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NOTES FROM THE ANATOMICAL ROOMS

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OF LOUISIANA.

BY

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Notes from the Anatomical Rooms of the Medical Department of Tulane University of Louisiana.

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Accessory Fasciculus of the Soleus in both Legs of the same Subject, associated with Absence of the Plantaris in both Extremities.

While demonstrating the posterior tibial region of an adult male negro subject the attention of the writer was called by Messrs. McCowen and Jowers, who were dissecting the part, to the total absence of the plantaris in both extremities. While verifying this assertion an anomalous muscular slip was exposed which, presented the following characteristics: On the left leg a flattened, but thick muscular slip, quite muscular in the upper two-thirds of its length, originating: (1) from the anterior (deep) surface of the soleus, about five centimeters below the lower tibial origin of this muscle (oblique line of tibia and middle third of its inner border); (2) from the transverse intermuscular septum, which separates it completely from the deep tibial group; (3) from the inner border of the posterior surface of the tibia, covering a space equal to the upper half of its lower third. From these points of attachment the muscle descends on a line almost parallel with the tendo Achillis, but midway between this and the tendon of the flexor longus pollicis, and in a more superficial plane than the latter tendon, to the inner tuberosity of the calcaneum, where it ends in a very distinct, though slender tendon.

On the right side, the muscle was much longer and had a more extensive origin, but terminated by a similar tendon at the same point in the calcaneum, viz.: the inner tuberosity. On this side the origin was (1) from the second fourth of the posterior surface of the fibula; (2) from the tendinous

arch of the soleus; (3) from the deep surface of the soleus, with the sheath of which it was very closely adherent; (4) from the inner border of the posterior surface of the tibia, from about the middle of this surface to a point about four centimeters above the inner malleolus. From this last point the thick muscular fasciculi rapidly contracted to a round tendon, which descended obliquely and superficially over the *flexor longus pollicis*, *flex. long. digit.* and *post tibial* vessels and nerves till it reached its destination at the inner tuberosity of the calcaneum. In both instances a distinct and quite large nerve filament could be traced from the posterior tibial nerve to the muscle.

Remarks.—Prof. Testut, in his great work, *Les Anomalies Musculaires* (G. Masson, Paris, 1884), discusses in his usual masterly manner the anomalies of the soleus, and classifies them under four heads: 1, Accessory fasciculus of the soleus; 2, gradual disappearance and absence of the tibial head; 3, direct insertion of the soleus into the calcaneum without connection with the tendon of the gastrocnemius; 4, tensor fasciculi of the soleal arch. After reading the literature of the subject as summarized by Testut, and his own interpretation of this anomaly, it cannot be doubted that the instance here reported is a variety of the so-called accessory fasciculus of the soleus described by Cruveilhier as the *soléaire surnuméraire*, or the *second soleus*, by Pye-Smith. “A third and broad supernumerary soleus muscle is sometimes found,” says Cruveilhier, “which is situated in front of the soleus, has the same attachments as this muscle, but is inserted into the calcaneum by an isolated tendon.” But this description of Cruveilhier’s is far from covering all the cases, and in reality is proper to one variety. Pye-Smith, Howse and Davies-Colley saw in 1869, their *second soleus* detaching itself in front of the ordinary soleus from the oblique line of the tibia and the enveloping aponeurosis of the common flexor of the toes. It was also attached to the inner

surface of the calcaneum by an isolated tendon. The preceding year Bankart, Pye-Smith and Phillips had come across an analogous case.

Chassaignac speaks of a peculiar tendon which the soleus sends to the superior surface of the calcaneum in front of the tendo Achillis. Hellema reports a similar observation.

In 1872 Davies-Colley, Taylor and Dalton observed a new specimen of the accessory tendon of the soleus which detached itself from the oblique line of the tibia, as well as from the deep surface of the normal muscle, terminating below in front of the tendo Achillis, on the surface of the calcaneum.

In the same year Beswick Perrin (*Medical Times and Gazette*) presents us with a description of an analogous small muscular fasciculus, but much shorter than the above, which had the same insertion, but originated above from the anterior surface of the tendon of the soleus. Quain, in his excellent work on the arteries, refers to a similar muscle which covered the posterior tibial artery.

Laskowski reported a similar muscle to Testut, which was found in his anatomical rooms at Geneva, but which was associated with a normal plantaris.

Testut himself has observed two instances of this anomaly. In both the plantaris was absent, as in the present instance, and in both the tendons were inserted on the inner surface of the calcaneum and originating from the anterior surface of the soleus.

In none of the cases thus far reported does there appear to have been so high an origin as in the right leg of the subject of this observation, or a distinct fibular origin of the anomalous muscle.

Anatomical significance: The present instance is a striking confirmation of the opinion of Testut, viz.: that this muscle, the so-called accessory soleus, is simply an anomalous plantaris. It adds another instance to the list above detailed of reported cases in which the appearance of this muscle has coincided with the total suppression of

the normal plantaris—the case of Laskowski excepted, which must be regarded as an example of double plantaris as suggested by Testut. If the view is accepted, that the plantaris is the homologue of the palmaris longus of the forearm, and that like it it is a rudimentary muscle, which is the functionless equivalent in man of a very powerful flexor in some of the lower vertebrates, and if we bear in mind the very numerous variations which these muscles, and the plantaris especially, exhibit in the human species, we will be impressed with the plausibility of Testut's explanation.

The object of the writer, however, is not to discuss the significance of this anomalous muscle, so much as to intelligently record this observation for the benefit of students of philosophic myology.

Notes on an Anomalous Muscle found in Dissection of the Posterior Part of the Leg of an Adult White, (Male) Subject.—An Independent Fibular Flexor Proprius of the Second Toe. By F. M. Thigpen, Medical Student, Medical Department, Tulane University of Louisiana.

Its upper portion consists of a flat band of fleshy fibres, about one inch in width, which arise by an aponeurosis from the posterior aspect of the lower part of the fibula, just above the external malleolus. Passing across the posterior surface of the lower extremity of the tibia, it becomes loosely attached to the tendons of the flexor longus pollicis, flexor longus digitorum and tibialis posticus, by means of connective tissue. Here the fibres change their direction downward and terminate in a long slender tendon, which passes about one inch behind the internal malleolus, and continuing onward into the sole of the foot, receives a well-marked tendinous slip from the flexor longus pollicis, and crosses above the tendon of the flexor longus digitorum to be inserted into the base of the last phalanx of the second toe, passing through a fissure in the tendon of the flexor

brevis digitorum in a manner similar to that of the tendons of the long common flexor.

RELATIONS.

1. *In the leg.*—Anteriorly it is in relation with the posterior surface of the lower extremity of the tibia, the tendons of the flexor longus pollicis, flexor longus digitorum and tibialis posticus, and the posterior tibial vessels and nerves.

Posteriorly it is in relation with a quantity of adipose tissue and the tendo Achillis.

2. As it passes through the interval between the inner malleolus and heel, it lies below the tendon of the flexor longus pollicis, and above the posterior tibial vessels and nerves.

3. As it passes downward into the foot it is in relation above with the tendon of the flexor longus pollicis and with the first lumbricalis, which is attached to it. *Below*, with the tendon of the flexor longus digitorum, the innermost tendon of the flexor brevis digitorum and the internal plantar nerve.

Internally, with abductor pollicis at its origin, and the lower part of the tendon of the flexor longus pollicis. *Externally*, with the flexor accessorius and the second lumbricalis.

The tendon, which should go to the second toe from the flexor longus digitorum, is wanting, and its deficiency is supplied by this anomalous muscle. Its point and manner of attachment in the foot, and the place at which it receives the tendinous slip from the flexor longus pollicis, are in every respect similar to those of the tendon from the normal muscle.

In the opposite leg of the same subject the flexor longus digitorum is normal, and the anomalous muscle described above is wanting.

REMARKS BY DR. MATAS.

The independent fasciculus to the second toe, which

Mr. Thigpen has accurately described, is quite interesting as a myological anomaly in man, not only because of its rarity (for the writer has not come across an exactly similar fasciculus in over two hundred subjects that have come under his observation, and neither is he aware of a precisely similar *recorded* example), but because its anatomical significance, when regarded in the light of its homologies and of the evidence furnished by comparative anatomy. At first sight this independent slip, with its completely separate origin and insertion, might be regarded as a simple repetition of another comparatively rare, but well established anomaly known as the *flexor proprius secundi digiti pedis*, which was first described by Bahnsen (Henle and Pfeufer's Zeitschrift, vol. xxxii, page 32), quoted by Testut (op. cit.) : by Shepherd, *Muscular Anomalies*, Wood's Reference Handbook of the Medical Sciences, and by Thane in Quain's Anatomy, ninth edition, 1882. But the present observation differs strikingly and radically from Bahnsen's flexor, which originates on the posterior surface of the *tibia*, while in the case under consideration the muscle is attached originally to the *fibula*. In Bahnsen's anomaly it is plain that the independent *flexor proprius secundi digiti* is like Bartholin's (also rare) *flexor proprius minimi digiti* (which also originates from the *tibia*), simply an evidence of exaggerated differentiation of the *flexor longus digitorum*. But the present anomaly suggests something more than a mere specialization in the tendons of a normal human muscle. It is in reality an abnormal reproduction in the human foot of a condition which is normal in inferior zoloölogical orders, in which the functional as well as the morphological homologies of the pelvic and thoracic limbs have been actively preserved. In order to make this statement more intelligible it will be necessary to revert briefly to the human and comparative characteristics of the long flexors of the toes.

It will be borne in mind that the original phalanges of the toes are flexed in man by two muscular bodies, which are

detached, the one and the other from the bones of the leg, and described in our classical texts under the names of the *flexor longus pollicis* and the *flexor longus digitorum*. The *flexor longus pollicis* originates invariably from the fibula; the *flexor longus digitorum* from the tibia. Neither ascends above the superior line of insertion of the soleus. Now, in most of the quadrumana the muscle of fibular origin (the flexor prop. pollicis) furnishes perforating tendons to the third and fourth toes. In hylobates it furnishes a tendon to the second toe (Gegenbaur, second ed., Human Anat.) In the Gibbon (*Hylobates leusciscus*), according to Bischoff the first, second, third and fourth toes are furnished with tendons by the fibular muscle; the fifth toe only being supplied by the tibial muscle, which in man is called the long common flexor of the toes. In the Gorilla the tendons to the second, third, fourth and fifth toes are supplied by the fibular flexor (*flexor longus pollicis* in man), according to Macalister.

These facts prove that the long flexor of the big toe and the long common flexor constitute a single muscle functionally, and they explain to usequally as well the connections which exist between these two muscles normally in the sole of the human foot. (Gegenbaur, op. cit.)

These connections we must now look into in order to elucidate our subject.

In the majority of cases the tendon of the *flexor longus pollicis* sends an external tendinous band, which soon divides into two secondary slips, which are furnished to the second and third toes respectively. These tendons blend with those which are supplied to the same toes by the long common flexor tendon. More rarely the flexor longus of the big toe sends a fasciculus to the fourth toe. On the other hand, it happens quite frequently that the external slip, furnished by the long flexor pollicis, is furnished exclusively to the second toe. The fifth toe never receives a tendinous band from the long flexor of the toe. The long common flexor of the toes is, therefore, reinforced by acces-

sory tendinous bands from the proper flexor of the big toe, for which reason it would appear that this muscle is more properly a common flexor of the toes, and could be properly distinguished as the *fibular flexor* of the toes as, Pagenstecker and Testut have done already, in order to distinguish it from the long common flexor of the toes, which should be distinguished as the *flexor tibialis*. The flexor longus pollicis, on the other hand, sometimes receives a tendinous bundle from the long *flexor communis*, this fasciculus being furnished on a level with the point of intersection of these two tendons.

Sometimes, however, these communicating bands are completely absent, and the tendons of the two muscles simply cross one another without any proper tendinous communications being transferred to either of them *

From the preceding data, which have been thus summarily presented, we may now return to the interpretation of the anomalous and independent fasciculus described by Mr. Thigpen. If we notice (1), that the muscle originates from the fibula and not from the tibia; (2) that it receives a well-marked slip from the long flexor of the big toe (in Simian anatomy, the *flexor fibularis*); and (3) that it is exclusively furnished to the second toe, yet being totally independent of the flexor longus digitorum, we cannot but conclude that it represents a highly differentiated portion of the *flexor fibularis*, reminding us vividly of the condition seen normally in the hylobates and other quadrumana already referred to, and is not to be considered as a specialized fasciculus of the long common flexor, as we would be led to believe by a more superficial examination.

This conclusion leads us to consider a step further the more philosophic significance of this anomalous fasciculus,

* These peculiar and interesting connections between the long flexor of the big toe and the common flexor in man, which are barely mentioned in our classical texts, have been the subject of most thorough and systematic study on the part of some of the ablest anatomical investigators, notably by Sir Wm. Turner (vide Transactions Royal Society of Edinburgh, vol. xxiv, 1865), and by F. E. Schultze of Rostock, 1867; also Wood, Macalister, Pye-Smith, Howse, Davies-Colley, Chudzinski, Gies, Murie and Flower and by Testut, who has presented us with a most thorough critical and erudite contribution in his monograph already quoted.

and I will be forgiven, I hope, if I digress for a moment to discuss the homologies of the long digital flexors of the foot with those of the upper extremity, in order that we may reach more lucidly the final lesson taught by this observation.

Wood, Macalister, Bahnsen and Hildebrandt have met rare instances in man of independent muscles, not supernumerary, in the upper extremity, which preserve a distinct autonomy from their origin to their insertion, and which have been designated by the names of flexor proprius indicis, flexor proprius minimi digiti and flexor proprius medii, these muscles corresponding in their terminal attachments to the corresponding tendons of the normal *flexores sublimes et flexores profundi digitorum*. These anomalies indicate a profound differentiation of the pronato-flexor mass of the forearm, and their analogy with the independent *flexor indicis pedis* here described is indeed almost identical morphologically. But the anomalies of the digital flexors of the thoracic limb must be given a very different interpretation than that which could be offered in explanation of the anomalies of the same muscles in the lower extremities. As Testut has said (op. cit.): "By the isolation of the two common flexors of the fingers, and by the complete independence of the long flexor of the thumb, the hand of man enjoys a most varied range of movements. It possesses in this respect an incontestable superiority over the hand of the primates. Some of the quadrumana, the gorilla and chimpanzee, for example, may sometimes present distinct flexors for the index, but we find in none of them a long flexor of the thumb distinct throughout its extent from the common flexor. Yet no matter how superior the human organ of touch may appear to us, we cannot deny that it could be perfected still more and that the anatomical independence of each one of the flexor tendons, for instance, would involve with it a *functional* independence of each one of the four last digits, which would prove extremely advantageous,

“Why should we not then see in the instances of partial independence of these tendons which have been recorded, the result of a natural tendency of an organ to evolve towards a better anatomical disposition, an endeavor to reach that state of ideal perfection which we are far from possessing, but which we may hope to reach some day?

“If this is true, we need not seek in forms below us for a normal type of an anatomical disposition which we have recognized as abnormal in man, in the shape of a proper flexor for the index, middle and little fingers and we must be led to admit that, by the side of the retrograde anomalies, which carry us back to an inferior type, there are other abnormal dispositions of another order, which elevate us towards a type still more perfect than the human type, and which might be designated in opposition to the preceding by the name of *progressive anomalies*.”

But can we apply Mr. Testut's plausible and, to say the least, pleasing interpretation of the anomalous independence of the digital flexor tendons of the upper extremity to those of the lower limb? Can we say that the existence in the lower limb of the subject dissected by Mr. Thigpen of an independent fibular flexor of the second toe is an evidence of progressive evolution, or a reminder of lower origin, an atavistic trait?

Formed originally on the same plan, the pronato-flexor region of the leg (Humphrey) is homologous with the pronato-flexor region of the forearm, and presents similar muscular elements, though its morphological characteristics have been profoundly modified by the necessities of adaptation to environment.

“The hand, that marvellous organ of prehension and of touch, had especial need of numerous and varied movements, and it is for this reason that the articulations which enter into its composition are so movable, and that the muscles designed to put them into play have remained distinct, preserving with their anatomical independence their functional independence. The foot in man, which is

intended above all to serve as a basis of support to the other segments of the inferior extremity, and by their mediation to the entire body, demands great solidity in its construction. For this reason we see the intrinsic articulations of the tarsus and metatarsus tending more and more towards an absolute immobility; the detailed and isolated movements giving way to the conjoined or associated movements, all the extensors and elevators, etc., fusing as if to concentrate their efforts in the production of these movements."

Such is, therefore, the manifest tendency of the human foot—a tendency towards consolidated action and aggregation of force, not its division and dispersion in isolated and autonomic actions; and thus, consequently, are we led to assume that any abnormal morphological disposition in a contrary direction cannot be of a perfecting, elevating or progressive character. This conclusion conforms to the facts of comparative anatomy, and leads me to believe that the independent tendon, described in this observation, like all those of a similar character in the foot, is merely a retrogressive trait, a vestigial phenomenon.

